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Client Reference: P-1846.000-US



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION of:
DIERICHS

Confirmation Number: 7876

Application No.: 10/816,169

Group Art Unit: 1756

Filed: April 2, 2004

Examiner: D. CHACKO DAVIS

Title: USE OF A RETICLE ABSORBER MATERIAL IN REDUCING ABERRATIONS

November 16, 2006

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the final Office Action dated May 17, 2006 (hereafter "the Final Office Action") and the Advisory Action dated November 9, 2006 (hereafter "the Advisory Action"), Applicant hereby requests that a panel of examiners formally review the legal and factual basis of the rejections in the above-identified application prior to the filing of an appeal brief. This request is being concurrently filed with a Notice of Appeal. For at least the reasons provided below, Applicant asserts that the rejections below are improper based both upon the omission of essential legal elements required to establish a *prima facie* case of novelty and non-obviousness and upon errors in facts.

Applicant respectfully requests review of the rejection of 1) claims 39-44, 46-51 and 53-57 under 35 U.S.C. §102(e) in view of U.S. 6,583,068 to Yan ("Yan"), 2) claims 1-6, 8-13, 15-25, 27-32, 34-38 and 58-62 under 35 U.S.C. §103(a) in view of Yan further in view of U.S. 2005/0136334 to Dierichs et al. ("Dierichs"), 3) claims 14 and 33 under 35 U.S.C. §103(a) in view of Yan and Dierichs and further in view of U.S. 2005/0040413 to Takahashi et al. ("Takahashi"), and 4) claim 52 under 35 U.S.C. §103(a) in view of Yan and further in view of Takahashi.

Rejections under 35 U.S.C. §102(e)

Applicant submits that the cited portions of Yan fail to disclose, teach or suggest a patterning structure comprising, *inter alia*, an aluminium coating with a protective top coating

having a thickness of about 0.1 to about 5 nm as recited in claim 39 and similarly, fail to disclose, teach or suggest a method of forming a patterning structure for use in a lithographic apparatus, the method comprising, *inter alia*, forming a protective coating having a thickness of about 0.1 to about 5 nm on top of the aluminium absorber as recited in claim 55.

The Final Office Action states that “Yan is depended upon to disclose the formation of a top layer (protective layer) on the absorber layer. Yan teaches forming a top layer of may be about 20 nm (about 20 nm includes about 5 nm).”

Applicant disagrees that the cited portions of Yan disclose, teach or suggest a protective coating having a thickness of about 0.1 to about 5 nm as recited in claims 1, 20, 39 and 55. Simply put, Applicant submits that a person skilled in the art in view of the nature of this art, the overall disclosure of Yan, and the difference in purpose of the claimed protective coating from the top layer in Yan would not view the disclosure in Yan of a top layer of “about 20 nm” as including a protective coating having a thickness of about 0.1 to about 5 nm.

First, 5 nm is one-quarter or 25% of the value of 20 nm. Stated differently, 20 nm is four times or 400% of the value of 5 nm. In view of such a large difference in value, Applicant submits that a person skilled in the art would not consider “about 20 nm” as including “about 5 nm” in the same manner that someone would not understand that a store is about a 5 minute walk away would mean or encompass about a 20 minute walk. The values are simply different in scale. So, while the word “about” allows for some deviation from the specified value, Applicant submits that a deviation of, for example, 400% is unreasonable in view of the disclosure of Yan and the nature of patterning structure (e.g., mask) technology, a technology which necessarily involves extremely small and precise dimensions in order to image typically even smaller and precise dimensions on a substrate.

The difference between “about 20 nm” and “about 5 nm” is also evident from the usage of other values of thickness in other parts of Yan. For example, Yan refers to the thickness of the absorber layer 1400 as being from “about 45-215 nm.” Using the underlying logic in the Final Office Action, that range should be covered simply by the statement of “about 130 nm” since, by extension of the underlying logic of the Final Office Action, “about 130 nm” should cover 33 nm to 520 nm. Clearly, such a result wouldn’t make sense and hence “about 20 nm” cannot encompass “about 5 nm.”

If the argument that “about 20 nm” encompasses “about 5 nm” is an inherency argument, then the Office Action has not provided any basis in fact and/or technical reasoning, as required by MPEP § 2112, to support the determination that a protective coating having a

thickness of about 0.1 to about 5 nm would necessarily result from the construction of Yan's mask with a top layer 1500 of "about 20 nm". At best, it might be possible that a top layer 1500 of about 0.1 to about 5 nm would be present, but it is not a certainty, which is required in a rejection based on inherency. "The mere fact that a certain thing *may result* from a given set of circumstances is insufficient to prove anticipation." *Electro Medical Systems, S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994) (emphasis in the original).

Applicant further submits that there are patentable differences between the protective coating as claimed and the top layer as disclosed in Yan; the claimed invention is not merely a design choice. A significant problem is design of an EUV lithographic process with little or no phase induced aberrations. For example, a problem with prior art EUV masks is that the top coating is of a material with a refractive index not close to an ideal refractive index and having a large thickness layer thereon that magnifies the deviation from an ideal refractive index. See, e.g., paragraphs 10 and 82-84 of Applicant's specification. Accordingly, Applicant's claimed invention recites a patterning structure suited for, e.g., EUV lithography, that comprises an aluminium coating or absorber having a protective top coating having a thickness of about 0.1 to about 5 nm. The aluminium coating or absorber is close to an ideal refractive index and is effective to eliminate or at least minimize the formation of aberration in the patterned beam. Further, the protective coating is sized to at least avoid impact on the effectiveness of the aluminium coating or absorber. For example, in EUV lithography, the protective coating would be thinner than the typical EUV wavelength used, i.e., about 13.5 nm, and accordingly will have little or no effect on EUV radiation.

The foregoing highlights a fundamental difference between the protective coating as claimed and the top layer of Yan. The protective coating as claimed is provided to protect the aluminium coating or absorber of the patterning structure, wherein the patterning structure improves imaging, due in large part, if not completely, by the aluminium coating or absorber eliminating or at least minimizing the formation of aberrations in the patterned beam. In contrast, the top layer of Yan is provided merely to improve contrast at UV/DUV wavelengths without consideration of aberrations. See, e.g., Yan, col. 1, lines 39-52. The top layer of Yan is designed to have a higher absorbance and/or lower reflectivity than the absorber layer. See, e.g., Yan, col. 3, lines 27-32. The effect of this is to improve contrast of the mask at UV/DUV wavelengths. See, e.g., Yan, col. 5, lines 33-36. Accordingly, it is a top layer of significant thickness to provide the high absorption and/or low reflection needed to improve contrast at UV/DUV wavelengths. An extremely thin top layer in Yan likely would not have the desired

effect in Yan as it would fail to properly absorb more radiation or reflect less radiation than the absorber layer below it in order to improve contrast. Hence, Yan discloses a top layer of significant thickness of about 20 nm. In contrast, the claimed protective coating is comparatively thin to protect the desired aluminium absorber or coating without introducing significant, if any, optical effects.

The Advisory Action asserts, in response to Applicant's arguments (which the Advisory Action has inaccurately recited and characterized), that "the claims do not recite a top coating or an aluminum layer or an absorber layer that has an ideal refractive index or close to an ideal refractive index to minimize aberration." Referring to paragraph 82 of Applicant's specification, aluminum has a refractive index of 1.0025 under applicable conditions, which is close to, if not exactly, an ideal refractive index of 1.0. Thus, Applicant's arguments were directed to the reasoning behind the claimed recitation of aluminum over materials of the prior art which cause aberration. But, in any event, the Advisory Action's assertions simply do not answer how the cited portions of Yan disclose, teach or suggest a protective coating having a thickness of about 0.1 to about 5 nm.

Therefore, the cited portions of Yan fail to disclose, teach or suggest all the features recited by claims 1, 20, 39 and 55.

Rejections under 35 U.S.C. §103(a)

With respect to the rejection of claims 1-6, 8-13, 15-25, 27-32, 34-38 and 58-62, Applicant submits that the comments above regarding Yan with respect to claims 39 and 55 apply analogously to claims 1 and 20. Thus, claims 1 and 20 are patentable over the cited portions of Yan. Furthermore, the cited portions of Dierichs fail to overcome any of the deficiencies of Yan. As admitted by the Final Office Action, the cited portions of Dierichs fail to disclose, teach or suggest a lithographic apparatus comprising, *inter alia*, an aluminium absorber layer with a protective top coating as recited in claim 1. Further, the cited portions of Dierichs, as admitted by the Final Office Action, fail to disclose, teach or suggest a device manufacturing method comprising, *inter alia*, minimizing formation of aberrations in the patterned beam by using a patterning structure having an aluminium absorber layer with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in claim 20. Therefore, claims 1-6, 8-13, 15-25, 27-32, 34-38 and 58-62 are patentable and allowable.

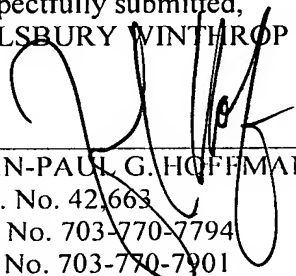
With respect to the rejection of claims 14 and 33, the comments above regarding Yan with respect to claims 39 and 55 applies analogously to claims 1 and 20, from which claims 14

and 33 depend respectively. Thus, claims 1 and 20 are patentable over the cited portions of Yan. Furthermore, the cited portions of Dierichs and Takahashi fail to overcome any of the deficiencies of Yan. As admitted by the Final Office Action, the cited portions of Dierichs and Takahashi fail to disclose, teach or suggest a lithographic apparatus comprising, *inter alia*, an aluminium absorber layer with a protective top coating as recited in claim 1. Further, the cited portions of Dierichs and/or of Takahashi, as admitted by the Final Office Action, fail to disclose, teach or suggest a device manufacturing method comprising, *inter alia*, minimizing formation of aberrations in the patterned beam by using a patterning structure having an aluminium absorber layer with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in claim 20. Therefore, claims 14 and 33 are patentable and allowable.

With respect to the rejection of claim 52, the cited portions of Yan fail to disclose, teach or suggest claim 39 from which claim 52 depends. Further, as admitted by the Final Office Action, the cited portions of Takahashi fail to overcome any of the deficiencies of Yan by failing to disclose, teach or suggest a patterning structure comprising, *inter alia*, an aluminium coating with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in claim 39. Therefore, claim 52 is patentable and allowable.

For at least the foregoing reasons, there are clear legal and factual deficiencies in the appealed claim rejections and it is respectfully requested that the panel return a decision concurring with Applicant's position and eliminating the need to file an appeal brief. Moreover, Applicant submits that the pending claims are clearly patentable and a decision by the review panel to this effect is respectfully and earnestly solicited. Please charge any fees associated with the submission of this paper to Deposit Account Number 033975.

Respectfully submitted,
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